RANAdvisor TrueSite™

Scalable Handheld Network and Service Testing

The introduction and rapid growth of smartphones and tablets within the wireless market has created congestion problems in networks worldwide. User behavior, driven by the new smartphone applications, has not only increased data usage, but also signaling and overall network issues. Mobile network operators need a solution that can replicate these issues on the same type of devices in the environments where customers experience them.

The ultra-portable cloud-enabled TrueSite solution makes it easy to test any indoor environment—including airports, stadiums, malls, and offices. TrueSite can be deployed on a single smartphone or as part of a multidevice system controlled from an Android™ tablet. Using an Android-based tablet app or smartphone, a single technician can discreetly gather data from up to six smartphones and a single receiver. TrueSite minimizes repeat data-capture walks and post-processing by immediately identifying and geo-locating missing/faulty antennas and macro-ingress issues during collection. TrueSite is the optimal solution for all your indoor testing needs.

Comprehensive, real-time fault detection tools detect missing/faulty antennas, macro ingress, blocked/dropped calls, connection failures, and test failures. Identifying faults in real time lets you resolve problems immediately, eliminating wasteful retests. This saves hours in getting the network up and running, and is particularly important during venue testing where access is very limited and re-testing is often not an option.

The cloud-enabled JDSU StrataSync service lets you manage, install, and update all your TrueSite devices as well as store and access your test data over-the-air from a central location.

StrataSync™ ENABLED

2014 MOBILITY TECHZONE LTE Visionary Award TMC

Key Benefits

- Helps quickly deploy and troubleshoot DAS and small cells
- Tests faster with real-time problem resolution
- Enables unobtrusive, discreet testing
- Minimizes repeat data capture walks
- Verifies hot spots quickly with active/passive WiFi testing
- Quickly validates services without writing scripts

Key Features

- Ultra-portable with an intuitive user interface
- Tablet app controls up to six devices and one receiver
- Automatically identifies missing/faulty antennas and macro-ingress issues during collection
- Fully iBwave design compatible; floor plans can be added as picture files (jpg/gif/bmp)
- Supports LTE, WCDMA, GSM, CDMA, RRC/NAS, LibPCAP, and EV-DO
- Graphical parallel sequencer
- Qualcomm DLF format logging
- Forcing within sequencer
- Flexible file naming
- Mapinfo Tab file support
- StrataSync Asset Management
- Customer installable*

*Contact JDSU for supported phones

Easy-to-Use Network Monitoring Tools

TrueSite is a compact, discreet, highly portable optimization solution that enables engineers to perform tests in complex indoor environments using a single TrueSite smartphone or TrueSite tablet-based controller solution. Engineers can test key services, such as voice, FTP, and web, while monitoring and logging all key network parameters. Devices can even be configured to start when the device is powered on, enabling engineers with less experience to also perform tests and collect data.

TrueSite supports a wide variety of smartphones and tablets and collects a wide range of network information from areas that are difficult to reach using typical drive-test tools. More importantly, it enables engineers to test the indoor network from the perspective of a smartphone subscriber. Easy configuration and full integration with the RANAdvisor platform provides a complete test collection and analysis solution.

The larger screen size of Android tablets makes it faster and easier to set up measurements and analyze results, so engineers can perform more tests in less time. The bigger display also shows measurement results and route maps simultaneously during replay for simpler, faster fault resolution.

With three simple operating modes for testing and user flexibility, TrueSite lets absolutely anyone conduct tests, giving providers ultimate resource flexibility.

OneTouch

OneTouch mode lets anyone who can power on the phone perform preconfigured tests without any intervention. Results can be automatically transferred via FTP or HTTPS to a central server for detailed analysis.

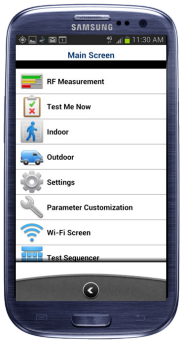
TestMeNow

TestMeNow mode offers additional flexibility for users without requiring detailed RF knowledge. TestMeNow can be configured to perform three tests, a voice test, an HTTP/HTTPS test (connect to a website), and an FTP (put and get) test, so providers can test their network the way their customers use it. Users can preconfigure, or amend, these three simple tests to verify the three key services delivered to customers at the push of a button with simple pass/fail indicators. All results are captured and stored and transferred via FTP or HTTPS to a central server for detailed analysis.

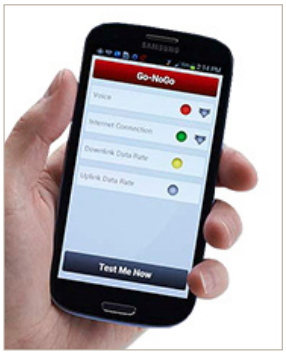
Engineering Mode

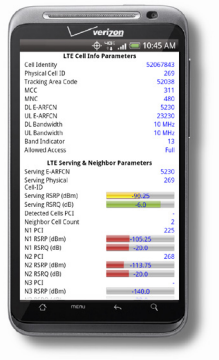
Engineering mode provides ultimate flexibility, letting users execute any test while providing access to all the measurements and tests being performed. The flexible graphical sequencer lets engineers preconfigure complex test scenarios for manual or automatic execution.

The flexible GUI enables instant access to all test capabilities with a single touch.



A customizable default screen lets anyone use the device without any training and start testing immediately.





TrueSite Controller

When part of a multidevice solution, TrueSite Controller software running on a tablet can control up to six handheld devices and a single receiver. It includes the following modules:

- Indoor Test Manager
- Indoor Fault Detection
- Receiver Measurements

Indoor Test Manager

This app provides all the capabilities required to configure all devices and tests including loading required iBwave floor plans. The app also provides real-time control for executing, recording, and mapping results. 3D-perspective mapping and navigation controls accurately locate and pinpoint problems, making testing easier and more intuitive. Floor plans can be imported as iBwave plans (with or without a transmitter file) or photos (in jpg/gif/bmp file formats) which can be taken with the tablet's camera. As you navigate through the test route, cell sectors will illuminate on the GUI as you approach them, indicating the sector's transmission direction and configuration. Up to eight measurements can be configured for display as an overlay on the map in real time.

Indoor Fault Detection

Optional fault detection tools enable the real-time identification and resolution of missing or faulty antennas and macro ingress.

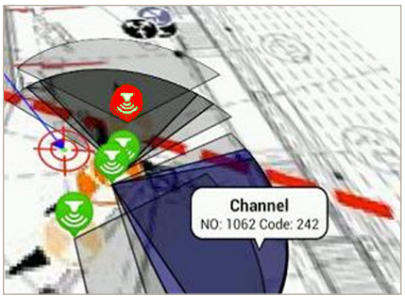
TrueSite compares the antenna specifications defined in the iBwave or cell site database file in real time with the measured values during capture and automatically reports any differences. For example, if an internal LTE antenna should be transmitting on PCI 21, and TrueSite detects that it is transmitting on PCI 35, it will alert the user so they can pause the capture and take remedial action before continuing. In the case of macro ingress, TrueSite automatically reports the macro cell site levels throughout the building as well as identifying any device that hands over to the macro network. This level of detail lets you adjust the network to ensure that users connect to the internal antennas rather than the external macro cell.

Receiver Measurements

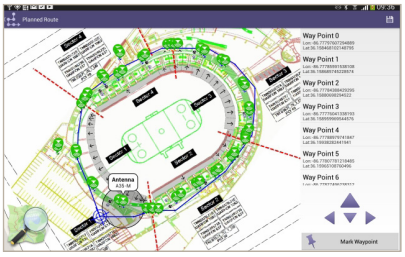
TrueSite captures measurements from a portable, battery-operated DRT 4311B receiver (ordered separately) housed in the TrueSite messenger bag. Receiver data augments data captured from handsets to provide additional information in real time so you can resolve problems faster.

Messenger Bag

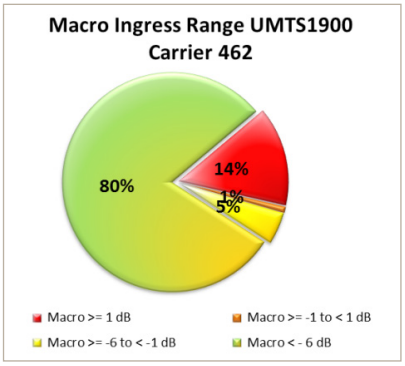
The discreet, ultra-portable messenger bag stores up to six devices and a receiver. Additional pockets provide additional storage for a tablet and any accessories that you may need when testing. The bag can be configured as an over-the-shoulder messenger bag or as a small backpack.



Indoor test manager



Indoor fault detection



Receiver measurements

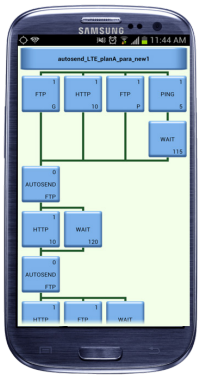
TrueSite Handheld Features

This section describes the main features of TrueSite handheld software and applies to both single handheld solutions and multidevice solutions controlled from a tablet with TrueSite Controller.

Parallel Test Sequencer

Customers use apps such as voice, web, and e-mail in parallel, so operators must be able to test their network the same way a user experiences it. That's why JDSU introduced the unique parallel test sequencer. The sequencer lets users create and run serial and parallel test sequences directly on the device to simplify test case setup when stress testing the network. The graphical display updates as the test runs to show each test's status. This capability clearly shows which tests are running as well as which tests have passed or failed. This highly graphical solution provides unparalleled flexibility and visibility on a handheld network test tool.

A simple GUI lets users configure tests by simply touching the test and running it serially or in parallel, which was never possible in a handheld device until now. The easy-to-understand screen displays serial tests from top to bottom, with parallel tests shown in the same row. Engineers can even share test sequences with other users to achieve consistent testing across dispersed teams.



Comprehensive test scenarios can be created and executed quickly, with failed tests indicated in red, passed tests in green, and tests being executed in grey.

Remote Control

Users can also control TrueSite handhelds via SMS from a controlling device to either single or multiple test devices. This capability enables deploying TrueSite at an unattended location and sending SMS command messages and updated files to engineers working in the field. The following command messages are supported: START, STOP, STATUS REPORT, LOAD LOCAL CONFIG FILE (stored on device), LOAD REMOTE CONFIG FILE (from an FTP server), LOAD LOCAL SEQUENCE FILE (stored on the device), and LOAD REMOTE SEQUENCER FILE (from an FTP server). JDSU also provides an application for Android phones that will send a START or STOP SMS to one or multiple handhelds.

Synchronize Multiple TrueSite Handhelds via Bluetooth®

In addition to using the multidevice TrueSite Controller app, it is possible to control and synchronize up to six handhelds, typically located in a messenger bag, from a control handheld. This is a standard capability of our handheld solution and does not use the TrueSite Controller software options or receiver described earlier. When recording is started on the controlling handheld, a Bluetooth message is sent to remote handhelds, instructing them to begin recording. This guarantees synchronization which is crucial during this type of testing. During outdoor collection, location information is synchronized via GPS.

During indoor collection, users can use predefined waypoint files that guide them through a predetermined test route or use the "I-am-here" capability to follow a different route. Each waypoint or I-am-here action on the control handheld will send a message via Bluetooth to all remote handhelds, synchronizing their position and test results within the test route with the controlling handheld.

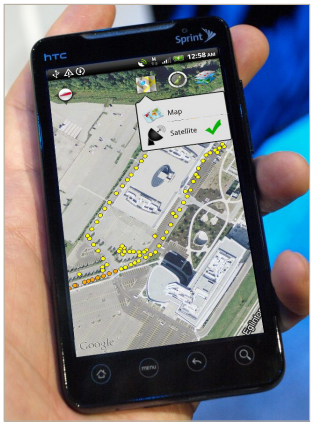
This capability provides a scalable, portable test solution that can record up to eight devices: one controlling device and up to seven devices in the backpack. This versatile solution is useful for verifying multiple operators in parallel, generating load at specific locations, testing small cells, or testing WiFi hotspots.

Visualization and Mapping

Users can view all measurements in Google maps so they can locate and resolve problems faster. Both street map and satellite views are supported indicating where you are, where you have been, and the signal strength of the area driven.

A cell-site database can be loaded into the device that shows the actual cell sites being tested on one display.

- Loads cell site files (compatible with drive test files)
- Shows site locations on indoor and outdoor maps
- Shows serving cell for current location
- Shows cell site name on parameter list view



Geo-Located Indoor Testing

Increased testing of indoor environments requires the ability to locate measurements on a map without GPS satellites. Creating waypoints and using outside GPS measurements makes it easy to view indoor measurements on the mapping interface. Also, it allows for logging the height of the measurements to create complex views of multistory buildings.

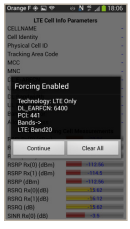
- Create and use waypoints to direct collection routes
- Simplify indoor map location using GPS outside the building
- Log indoor map height when testing multiple floors

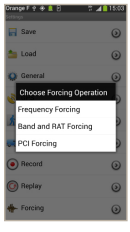
View Measurements on Indoor Floor Plans and Outdoor Maps

When testing indoors or outdoors, you can define up to eight different measurements to be displayed in real time on floor plans or on maps. This lets you make instant decisions on performance without the need to wait for post-processing to determine if a problem exists. These measurements can be displayed on an individual TrueSite handheld device or on the TrueSite controlling tablet.

Forcing and Locking

When deploying a new cell site, adding a new overlay frequency at an existing cell site, or revalidating the existing frequencies deployed, the JDSU solution can lock the device, without requiring a power cycle, to a specific RAT, band, frequency, channel, or PCI, guaranteeing that it will remain at that setting despite network conditions so users can complete the test and validate the frequency band. Forcing actions can also be applied during test sequences for even easier testing.





When testing an existing or deploying a new frequency, engineers must be able to force/lock their phone to the specific channel under test, irrespective of where they are within the cell coverage area. Using only a commercial handset, JDSU can lock to a specific WCDMA/UARFCN frequency without risking handovers to other frequencies or technologies, so providers can generate revenues faster. LTE EARFCN and PCI locking is also supported on commercial devices. An alert will be displayed on the screen when it is in a locked mode to alert engineers in case they do not want to use the device in locked mode.

The Forcing Functions table summarizes the available forcing capabilities. For details about all the forcing capabilities and devices supported, refer to the Configuration Guide or contact JDSU.

Forcing Functions	
Function	***Device***
UARFCN preference	HTC
UARFCN lock	Samsung S2/S3/S4
EARFCN preference	Samsung S2/S3/S4
Band, RAT forcing	Samsung S2/S3/S4
Airline mode forcing	Samsung S2/S3/S4
EV-DO channel lock	Samsung S3
LTE PCI lock	Samsung S4 (i9506, i9507)
Note 3	SM-N900T

Contact JDSU for others

Customizable for the Needs of Each Engineer

Displaying hundreds of parameters helps engineers see everything they want; however, in many cases, they are only interested in specific parameters for each technology. The customizable GUI lets each engineer configure their device to display only the parameters they need to perform their work. For engineers who share devices, each engineer can save their customized view to a profile on the device that they can load when they use the device.

Users can:

- Customize screen views
- Choose the number of parameters needed
- Save multiple screen layouts
- Recall saved screen layouts during recording or playback
- Share screen layouts with other users

User-Defined Interactive Charting

Create your own specific line charts with just the measurements that you need to view.

Up to four different charts can be defined to appear in the RF Measurement screen to enable real-time analysis over the time of selected measurements such as RSRP. Up to four measurements can be defined per chart. Thirteen charts are delivered with the software, however, users can create and save their own charts for future use. An example LTE chart is shown opposite.

Interactive charting allows any measurement displayed on the RF measurement screen to be charted during testing by tapping the required measurement. Multiple measurements can be charted as shown opposite. When finished, tapping the measurement will remove the chart.

StrataSync

StrataSync is a cloud-based service that provides asset management, configuration management, and test data management.

Asset Management

Asset management enables the StrataSync administrator to automatically manage and update all devices OTA in a timely and consistent manner, minimizing manual updates and mistakes. It also allows new configuration, sequencer files, and more to be downloaded to any device. Automatic updates and downloads eliminate the need for technicians to manually update their devices, saving time and money. Ensuring all devices have the same versions loaded makes comparing results between devices easier and delivers more consistent results during testing.

Asset Management enables automatic OTA downloading:

- Software installation on devices
- Software upgrades to devices
- Configuration files
- Sequence files
- iBwave plans
- Map files
- Map overlays
- Cell site database files
- Threshold files

StrataSync also tracks your valuable assets' location and to whom they are assigned. All TrueSite™ devices report their GPS location, model, Android, kernel, and application version to StrataSync each time the application starts.

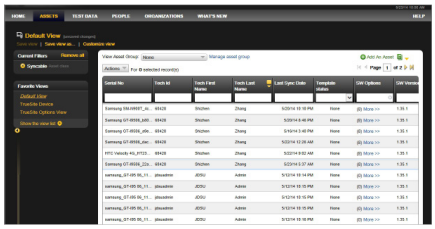
Test Data Management

StrataSync also enables you to automatically upload and securely store all test data result files in the cloud. Result files can be uploaded while a technician is still in the building enabling colleagues for remote post-processing and analysis of the data while the technician gathers data on a different floor or in another area of the building. This remote analysis will help minimize the need to revisit a building as the post-processing engineer can tell the technician on site to perform a retest or to conduct any additional tests before moving to a different building. With StrataSync, the remote engineer can even load a specific sequence onto the technician's device for the additional test.

This ability to have results available in near-real time at a central location also enables you to close out contracts faster by confirming the results are correct and forwarding them to your customer for payment rather than the need to wait for the engineer to return to the office.

StrataSync Asset Management and Test Data Management are included with SUS and require a valid SUS license to remain active.

StrataSync lets you manage assets, test data, and people with one device.



StrataSync Asset Management helps you to keep track of your test devices with TrueSite.

RANAdvisor Handheld Analysis Options

Log files captured by TrueSite handheld can be analyzed in several ways:

- Directly on the device
- Using RANAdvisor PC software with post-processing tools such as Gladiator™ and Windcatcher™
- At a remote location via FTP or HTTPS upload

Measurements and Tests

Sequencer tests

- AUTOSEND — uploads log files via FTP or HTTPS
- Circuit switch fall back (CSFB) — key for evaluating LTE and 3G service delivery
- E-mail — tests if an e-mail can be sent to itself within a certain time
- EV-DOCH — checks the current EV-DO channel and compares it with the requested channel
- Force band
- Force RAT
- FTP — uploads and downloads files from any FTP site such as YouTube. Within the FTP test settings, you can configure the test to maintain the FTP session, eliminating the need to reconnect to the FTP server each time. The test shows the average and total throughput for session, and it can be configured to show throughput at user-defined periods during the session.
- HTTP — configurable to connect to any URL
- iPERF — measures maximum TCP and UDP bandwidth
- MMS — tests if an MMS can be sent to itself within a certain time
- MT voice — tests for incoming calls
- PDPACT — performs a PDP activation
- PING — test simple network connectivity, round-trip time, and PING connectivity
- POLQA voice quality test (refer to the Configuration Guide or contact JDSU for list of supported devices)
- RFTOGGLE — enables airline mode for the configured period
- SMS — tests if an SMS can be sent to itself within a certain time
- TECHCHK — checks if the device is registered to a specific technology such as LTE or WCDMA
- Trace RT/Trace RT change — in normal mode, this test runs a trace route on a data connection and diagnostically determines the route taken to a destination by sending Internet control message protocol (ICMP) echo packets with varying time-to-live (TTL) values to the destination. When configured in change mode, it will alert to any changes in the IP route from the normal test.
- Video — displays video on any available network including WiFi
- Sequencer loop — within a test's additional settings, you can configure a sequence to loop indefinitely with results stored in a single log file.

Measurements

LTE Cell Info Parameters	LTE ML1 Serving Cell Measurements	LTE Serving and Neighbor Parameters	LTE Demodulation Configuration Parameters	LTE RACH Request Parameters	LTE RACH Response Parameters	Summary Parameters	Protocol
Cell identity (28 bits)	RSSI Rx(0) dBm	Serving E-ARFCN	PDSCH RNTI ID	RACH RNTI	RACH response RX time	Satellites visible	RRC protocol
Tracking Area Code (16 bits)	RSSI Rx(1) dBm	Serving physical cell-ID	PDSCH RNTI type	RACH preamble		Satellites tracked	NAS protocol
	RSSI dBm		Number of Tx antennas	Cyclic shift	Timing advance	Voice tests	
MCC	RSRP Rx(0) dBm	Serving RSRP (dBm)		PRACH Tx power (dBm)	Temporary C-RNTI	Blocked calls	
MNC	RSRP Rx(1) dBm	Serving RSRQ (dB)	Number of Rx antennas		MCS	Dropped calls	
Physical cell ID	RSRP dBm	Detected cells PCI			TPC for PUSCH	FTP transfers	
DL E-ARFCN	RSRQ Rx(0) dBm	Neighbor cell count	Transmission mode		Hopping flag	FTP throughput (kbps)	
UL E-ARFCN	RSRQ Rx(1) dBm		Spatial rank		UL delay		
DL BW	RSRQ dBm	N1 PCI	RB allocation for slot 0 (%)		CQI request	HTTP transfer	
Band indicator	SINR Rx(0) dB	N1 RSRP (dBm)			RB assignment	HTTP throughput	
Allowed access	SINR Rx(1) dB	N1 RSRQ (dB)	RB allocation for slot 1 (%)		RACH procedure type		
		N2 PCI					
		N2 RSRP (dBm)	Frequency selective PMI		RNTI type		
		N2 RSRQ (dB)			RNTI value		
		N3 PCI	PMI index				
		N3 RSRP (dBm)	Stream 0 TBS (bits)				
		N3 RSRQ (dB)	Stream 0 modulation				
		N4 PCI					
		N4 RSRP (dBm)	Traffic-to-pilot block ratio				
		N4 RSRQ (dB)					
			Stream 1 TBS (bits)				
			Stream 1 modulation				
			PB				

Measurements continued

CDMA Signal Quality	CDMA Serving and Neighbor Parameters	EV-DO-Serving Site Parameters	1xEV-DO Serving and Neighbor Parameters	EV-DO Data Parameters	Summary Parameters	Protocol
RF mode	Active PNs	Channel	Active PNs	RLP Tx throughput (kbps)	Satellites visible	CDMA Layer 3
CDMA Rx state	Active PN 1 pilot	RF mode	Active PN 1 pilot		Satellites tracked	EV-DO Layer 3
Phone state	Active PN 1 Ec/Io (dB)	Band class	Active PN 1 Ec/Io (dB)	RLP Tx burst size (kb)	Voice tests	
Current channel	Active PN 2 pilot	AT state	Active PN 2 pilot	AT requested DRC rate	Blocked calls	
Code channel	Active PN 2 Ec/Io (dB)	Serving PN	Active PN 2 Ec/Io (dB)		Dropped calls	
Pilot base	Active PN 3 pilot	Serving SINR	Active PN 3 pilot	ARQ effective receive rate	FTP transfers	
Handoff state	Active PN 3 Ec/Io (dB)	UATI	Active PN 3 Ec/Io (dB)		FTP throughput (kbps)	
Tx gain adjust (dBm)	Candidate PNs	UATI color code	Candidate PNs	RLP Rx throughput (kbps)		
Rx power (dBm)	Neighbor PNs	Rx0 power (dBm)	Neighbor PNs		HTTP transfer	
Agg Ec/Io (dB)		Rx1 power (dBm)		RLP Rx burst size (kb)	HTTP throughput (kbps)	
Tx power (dBm)		Tx power (dBm)				
FER						

GSM Parameters	GPRS/EDGE Parameters	UMTS Parameters	HSDPA Parameters	HSUPA Parameters	Summary Parameters	WiFi
ARFCN	C/I	UARFCN	AVG MAC rate	TTI In Use	Satellites visible	BSSID
BCCH	EGPRS DL CS	Cell ID	AVG schedule rate	Primary E-RNTI	Satellites tracked	SSID
BSIC	EGPRS UL CS	RRC state	AVG served rate	Secondary E-RNTI	Voice tests	Frequency
Cell ID	EDGE support	Rx power	Modulation scheme	HSUPA HARQ throughput (kBps)	Blocked calls	Signal strength (dBm)
MCC	ACC burst type	Tx power	DL HS-PDSCH BLER		Dropped calls	Capabilities (such as the security setting)
MNC	Allocation type	SC MCC	DL HSDPA throughput	HSUPA BLER (%)	FTP transfers	
LAC	Control ACK type	SC MNC		Happy bits (%)	FTP throughput (kbps)	
Mode	DL TS allocation	RLC DL throughput	CQI sample count	Not-happy bits (%)		
Rx level full	UL TS allocation	RLC UL throughput	CQI valid count		HTTP transfer	
Rx level sub	ACK mode	Ec/Io	CQI average		HTTP throughput (kbps)	
Rx qual full	DL CS	BLER	% ACKS			
Rx qual sub	DL TBF state	No trans channels	& NACKS		IMEI	
Timeslot	DL TFI	Trans channel ind	% DTX		MEID	
Timing advance	UL CS	Scrambling Code				
Tx vevel	UL TBF state	RSCP				
C1	UL TFI	RLC TX and TX throughput				
C2	DL LLC throughput					
DSF	DL RLC/MAC throughput	MAC TX and RX throughput				
DTX						
FER	UL LLC throughput					
HSN	UL RLC/MAC throughput					
HOP LIST						
HOP FLAG	DL RTX RLC block rate					
MAIO	UL RTX RLC blocks					
RLT	UL TX RLC blocks					
	UL TX RLC blocks					

TrueSite Lite

TrueSite Lite meets the needs of customers who don't require all of the sophisticated functionality of the full version. Lite is available on select devices listed in the Supported Devices table and provides the following capabilities:

- Recording and payback
- Test sequencer (voice and FTP tests)
- Main parameters screen
- Customization of main parameters screen
- Google Maps display for outdoors
- TestMeNow mode including web test
- Cell-site database support
- Forcing features
- WiFi measurements
- Protocol display

The lite version can be upgraded to the full version. Please refer to the ordering information for details on how to order the lite and upgrade versions and which devices are supported.

Supported Tablet Controllers

TrueSite Controller supports generic tablets with the following Android versions:

- 4.0 Ice Cream Sandwich
- 4.1.1; 4.1.2; 4.3 (as the master tablet) Jelly Bean

Unless listed in the ordering section, all tablets are customer supplied. JDSU has tested the following tablets:

- Google Nexus 7
- Google Nexus 10
- HTC Flyer
- Samsung GT-N5120
- Samsung GT-N8000
- Samsung GT-N8020
- Samsung GT-P5210
- Samsung GT-P5210
- Samsung SGH-I497 (also supported as a master/slave tablet)
- Samsung SGH-I957

Support and Update Services (SUS)

A SUS license, required with all TrueSite orders, provides support and software updates for 1-year, 2-year, 3-year, or custom durations.

Ordering Options

Please refer to the Configuration Guide or contact JDSU for details about all of the supported devices and software options.

Description	Technology	Frequency in MHz (Bands)	Part Number
RANAdvisor TrueSite Software			
POLQA voice quality testing software license[1]			E5643B-100
Upgrade from Lite to full version			E5643B-200
TrueSite indoor test manager			E5643B-120
Indoor fault detection tools			E5643B-121
Receiver measurements support			E5643B-122
Messenger bag carry solution			E6473B-941
Support and Update Services (SUS) (includes TrueSite Asset Management and Test Data Management StrataSync licenses)			
1 year SUS			E5643B-901
2 year SUS			E5643B-903
3 year SUS			E5643B-902

1. POLQA voice quality testing between two supported devices as listed in the Configuration Guide. Only the calling device requires an E5643B-100 license, which is not available on the Lite version.

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